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MANUFACTURE OF MULTILAYER PRINTED WIRING BOARD

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ABSTRACT

PURPOSE: To obtain a multilayer printed wiring board on which wiring can be formed at a high density and which has simple surface via holes by sticking copper foil to a B-stage adhesive layer after boring a hole through a substrate carrying the B-stage adhesive layer.

CONSTITUTION: The manufacture of the title multilayer printed ***wiring*** ***board*** is characterized by the following processes. (a) An adhesive layer is formed on first metallic foil and is made a B-stage adhesive layer. A hole is bored through the first ***metallic*** ***foil*** coated with the B-stage adhesive layer. (c) Second metallic foil is stuck to the surface of the adhesive layer on the first metallic foil and they are integrally laminated by heating and pressurizing them. (d) A wiring is formed by etching off the unnecessary part of the second ***metallic*** ***foil***. (e) The metallic foil in which the wiring is formed is put on an inner-layer substrate having an inner-layer wiring with an adhesive resin layer in between and they are integrally laminated by heating and pressurizing them. (f) A hole is formed through the integrally laminated layer. (g) A wiring is formed on the laminated layer. (h) A ***metallic*** layer is formed on the internal surface of the through hole for electrical connection.

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TITLE: Multilayer printed wiring board manufacturing method - involving adhesive agent layer formation on first metal foil followed by drilling holes and attachment of second metal foil through application of pressure and heat

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BASIC-ABSTRACT:

The method involves several steps. To start with, an adhesive agent layer is formed on the first metal foil. The metal foil is turned up side down. Next a process is executed to form a hole in the first metal foil. A second metal foil is fixed on the adhesive agent layer by application of heat and pressure. Next a wiring is formed by etching the unwanted portion of second metal foil. An adhesive resin layer is formed on the wiring layer. By application of heat and pressure the metal foils-adhesive resin layer structure is laminated on the PCB substrate. Multiple units are stacked and laminated by repeating this process. Then a via hole is drilled through the structure.

ADVANTAGE - Increases wiring density. Provides simple multilayer PCB with surface via hole.

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CLAIMS

[Claim(s)]

[Claim 1] The electric device characterized by providing a connection means to connect alternatively the terminal area of arbitrary setting means of operation to the terminal area of the terminal area prepared in two or more setting means of operation and; operation part in which different operation to a part of operation and; operation part is made to perform, and each setting means of operation, respectively, and; operation part, and;.

[Claim 2] The electric device according to claim 1 characterized by providing the case object which was made to face a terminal area outside and was established while establishing the part of operation and the setting means of operation.

[Claim 3] It is the electric device according to claim 2 which a case main part has two or more plug holes faced and prepared in each terminal area, and is characterized by a connection means being a pin connected to a terminal area through a plug hole.

[Claim 4] It is the electric device Claim 1 or given [any 1] in three characterized by preparing a terminal area in a circuit board.

[Claim 5] It is the electric device Claim 1 or given [any 1] in four characterized by a part of operation being a subsequent movement circuit part which controls subsequent movement time.

[Claim 6] It is the electric device Claim 1 or given [any 1] in four characterized by a part of operation being a modulated light circuit part which controls modulated light.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the electric device which enables adjustment of operation by a part of operation.

[0002]

[Description of the Prior Art] As this kind of an electric device, there are a subsequent movement switch, dimmer control, etc., for example.

[0003] With the subsequent movement switch, subsequent movement time of load is adjusted by connecting volume to a damping time constant circuit, and carrying out variable [of the resistance of this volume].

[0004] In dimmer control, by connecting electric power controlling elements, such as try AKKU, to a power supply, connecting the volume for a modulated light setup to the gate of this try AKKU, and carrying out variable [of the resistance of this volume], a phase angle is changed and modulated light is adjusted.

[0005]

[Problem to be solved by the invention] However, by the conventional electric device, in order to adjust operation, such as subsequent movement time and modulated light, use expensive volume, and it can kick, and moreover, volume needs big storage space compared with ***** and other electronic parts, and there are problems, such as becoming large-sized.

[0006] This invention was not made in view of such a point, and volume is not used for it, but it can adjust operation, and aims at offering the electric device which can attain a miniaturization.

[0007]

[Means for solving problem] [an electric device according to claim 1] The connection means and; to which the terminal area of arbitrary setting means of operation is alternatively connected to the terminal area of the terminal area prepared in two or more setting means of operation and; operation part in which different operation to a part of operation and; operation part is made to perform, and each setting means of operation, respectively, and; operation part are provided.

[0008] By connecting alternatively the terminal area of arbitrary setting means of operation to the terminal area of a part of operation by a connection means, volume is not used but operation of a part of operation is adjusted. In addition, including the modulated light circuit part as for which a part of operation controls the subsequent movement circuit part which controls subsequent movement time, and modulated light, for example, the subsequent movement time when subsequent movement circuit parts differ is set up, or, as for a setting means of operation, the modulated light value from which a modulated light circuit part differs is set up.

[0009] In an electric device according to claim 1, an electric device according to claim 2 possesses the case object which was made to face a terminal area outside and prepared it while establishing a part of operation and a setting means of operation, and it makes a connection means connectable from the exterior of a case object.

[0010] An electric device according to claim 3 has two or more plug holes which faced the case object each terminal area and were prepared in an electric device according to claim 2, and a connection means is a pin connected to a terminal area through a plug hole, and enables connection with the terminal area which corresponds if a pin is inserted in the arbitrary plug holes of the external surface of a case object.

[0011] In an electric device Claim 1 or given [any 1] in three, an electric device according to claim 4 is formed in a circuit board, electric connection of the terminal area is made in the circuit on a circuit board, or a terminal area makes the assembly of it possible to a product together with a circuit board.

[0012] In an electric device Claim 1 or given [any 1] in four, a part of operation is a subsequent movement circuit part which controls subsequent movement time, and volume is not used for an electric device according to claim 5, but adjustment of subsequent movement time is enabled.

[0013] In an electric device Claim 1 or given [any 1] in four, a part of operation is a modulated light circuit part which controls modulated light, and volume is not used for an electric device according to claim 6, but adjustment of modulated light is enabled.

[0014]

[Mode for carrying out the invention] The form of 1 operation of the electric device of this invention is hereafter explained with reference to Drawings.

[0015] The form of the 1st operation is shown in drawing 1 or drawing 3 , and, as for a **** sectional view and drawing 2 , a **** sectional view and drawing 3 of drawing 1 are the circuit diagrams of the damping time constant circuit of a delay circuit part from an end face about a subsequent movement switch from the side in a subsequent movement switch.

[0016] In drawing 1 and drawing 2 , 1 is a 1 module type case object, and this case object 1 has the cover 3 put on a case 2 and the front of this case 2. A case 2 is formed in box-like [which carries out an opening in the direction of the front], the stowage 4 of a main part is formed in the center, and the terminal stowage 5 is formed in both ends. Corresponding to the position of a terminal area mentioned later, three plug holes 6 are formed in the rear surface of the stowage 4 of a main part of a case 2 along with the shape of one row, and the electric wire insertion hole 7 is formed in the rear surface of each terminal stowage 5. The opening 9 arranged possible [rocking of the operation child 8 who performs on--off operation] is formed in the center of a cover 3. And the case object 1 is attached to the wiring support which is not illustrated, and is attached to the wiring box laid under the wall surface.

[0017] While the subsequent movement switch main part 11 is stored by the stowage 4 of a main part within the case object 1, the wire splicing terminal which is not illustrated is stored by the terminal stowage 5.

[0018] The subsequent movement switch main part 11 has the circuit board 12, and the

subsequent movement circuit part 17 as electric elements, such as try AKKU 13, the coil 14 and capacitor 15 as an electric power controlling element, a barista 16, etc. who perform switching to load, and a part of operation etc. is mounted in this circuit board 12. The subsequent movement circuit part 17 is mounted in the circuit board 18 connected almost perpendicularly to the circuit board 12, and controls the subsequent movement time of try AKKU 13 by a damping time constant circuit. The terminal area 19a for adjusting subsequent movement time to the edge which attends the plug hole 6a of the circuit board 18, 6b, and 6c alternatively, 19b, and 19c It is mounted. Each terminal area 19a, 19b, and 19c It is almost cylindrical and press fit connection of the lead of the pin mentioned later is enabled.

[0019] As the damping time constant circuit of the subsequent movement circuit part 17 is shown in drawing 3 , it consists of a capacitor C1, resistance R1 from which the resistance as a setting means of operation differs, and R2, and each resistance R1 and two kinds of subsequent movement time corresponding to the resistance of R2 are set up by a capacitor C1, and resistance R1 and either of R2. It is a terminal area 19a to the capacitor C1 side. It is prepared and they are a terminal area 19b and 19c to each resistance R1 and R2 side. It is prepared, respectively and is a terminal area 19a. It receives and they are the arbitrary terminal areas 19b and 19c. He is trying to connect alternatively. In addition, as shown in drawing 2 , in the circuit board 18, it is a terminal area 19a to a center. It is arranged and they are a terminal area 19b and 19c to both sides. It is arranged.

[0020] And as shown in drawing 1 and drawing 2 , they are a terminal area 19a, 19b, and 19c. A pin 20 is used as a connection means of a between. This pin 20 has the lead 21 mostly formed in KO type, and the intermediate part except the both ends of a lead 21 is covered in the covering part 22 which has insulation.

[0021] Next, an operation of the form of this operation is explained.

[0022] In carrying out wiring construction of the subsequent movement switch, arbitrary subsequent movement time is chosen and set up from the inside of two kinds of subsequent movement time. Namely, by making the plug hole 6b and either of the 6c face the other end, while making the central plug hole 6a face one end of a pin 20, and inserting the both ends of a pin 20, respectively One end of a pin 20 is a terminal area 19a. While press fit connection is made, the other ends are a terminal area 19b and 19c. Press fit connection is made at inner either. Since it is inserted in the plug hole 6a, the plug hole 6b, and either of the 6c to the portion of the covering part 22 in the state of the plug of this pin 20, respectively, the amount of [of a pin 20] conductive part does not expose outside.

[0023] By connection by this pin 20, resistance R1 and either of R2 are connected with a capacitor C1. The subsequent movement time when the damping time constant circuit of the subsequent movement circuit part 17 becomes settled in each resistance R1 and the resistance of R2 by a capacitor C1, and resistance R1 and either of R2 is set up.

[0024] Thus, it is the exterior of the case object 1 to the terminal area 19a by a pin 20. The arbitrary terminal areas 19b and 19c By connecting alternatively, volume is not used but subsequent movement time can be adjusted easily. And pins 20 are the terminal area 19a which corresponds if it inserts in the plug hole 6a prepared in the external surface of the case object 1, 6b, and 6c, 19b, and 19c. It is easily connectable.

[0025] Moreover, a terminal area 19a, 19b, and 19c Since it is prepared in the circuit board 18, while the electric connection with the subsequent movement circuit part 17 is easy, it can attach to the subsequent movement switch main part 11 easily by the circuit board 18.

[0026] Moreover, by not using volume, it can do small and a subsequent movement switch can be stored in 1 module type.

[0027] The form of the 2nd operation is shown in drawing 4 and drawing 5 , drawing 4 is the circuit diagram of dimmer control, and drawing 5 is the perspective view of a decomposition state of dimmer control.

[0028] It is resistance R11 to the terminal 31 to which a commercial alternating current power supply is connected in drawing 4 , and 32. It reaches, the parallel circuit of neon bulb N and Switch S is minded, and it is the capacitor C11 for smooth. It connects and is this capacitor C11. Inductor L is minded in parallel and it is try AKKU Tri. It connects. Try AKKU Tri The resistance R12 which constitutes a damping time constant circuit through Diack Da in a gate, a capacitor C12, resistance R13, the resistance R14 from which the resistance as a setting means of operation differs, and R15 And capacitor capacitor C13 It connects. And it is resistance R14 and R15 as a damping time constant circuit. By using either, it is each resistance R14 and R15. Two kinds of modulated light values corresponding to resistance are set up. This damping time constant circuit and try AKKU Tri A modulated light circuit part is constituted. Capacitor C13 In a side, it is a terminal area 33a. It is prepared and is resistance R14. In a side, it is a terminal area 33b. It is prepared and is resistance R15. In a side, it is a terminal area 33c. It is prepared. Moreover, try AKKU Tri The light which it receives and is not illustrated in series is connected electrically.

[0029] In drawing 5 , 41 is an insulating board, a modulated light circuit etc. is carried on this insulating board 41, this insulating board 41 is stored by the case inside of the body of 1 module type wiring accessories like the form of the 1st operation, and dimmer control is constituted.

[0030] On the insulating board 41, the concave terminal attachment 42, 43 and the part 44 with electric conduction Itadori, and 45 are formed, respectively. A terminal 31 and 32 fit into the terminal attachment 42 and 43, respectively, screw clamp fixation is carried out, the electric conduction board 46 and 47 fit into the part 44 with electric conduction Itadori, and 45, respectively, and screw clamp fixation is carried out. The substrate fitting part 48 and 49 are formed in the electric conduction board 46 and 47, and the projected part 51 of the circuit

board 50 and 52 fit into these substrate fitting part 48 and 49.

[0031] Moreover, a terminal 31 constitutes the circuit part a of the modulated light circuit shown in drawing 4, a terminal 32 constitutes this circuit part b, the electric conduction board 46 constitutes this circuit part c, and the electric conduction board 47 constitutes this circuit part d. Resistance R11 connected between the circuit part a and the circuit part c And neon bulb N, Switch S is the capacitor C11 which is connected to a terminal 31 and the electric conduction board 46, and is connected between the circuit part b and the circuit part c. It connects with a terminal 32 and the electric conduction board 46. The inductor L connected between the circuit part b and the circuit part d is try AKKU Tri which is connected to a terminal 32 and the electric conduction board 47, and is connected between the circuit part c and the circuit part d. It connects with the electric conduction board 46 and 47. Connection of these parts is made with ***** , spot welding, soldering, etc.

[0032] Moreover, a damping time constant circuit etc. is carried in the circuit board 50. They are the terminal area 33a of a damping time constant circuit, 33b, and 33c like the form of the 1st operation. Make the plug hole formed in the external surface of a case object attend, and it prepares. The arrangement is a terminal area 33a. It is considered as a center and they are a terminal area 33b and 33c. It arranges on both sides and they are a terminal area 33a, 33b, and 33c further. A pin is used as a connection means.

[0033] And in carrying out wiring construction of the dimmer control, arbitrary modulated light values are chosen and set up from the inside of two kinds of modulated light values. That is, like the form of the 1st operation, a pin is inserted in arbitrary plug holes and one end of a pin is a terminal area 33a by ***** . While connecting, the other ends are a terminal area 33b and 33c. It connects with inner either.

[0034] Resistance R14 and R15 If inner resistance is high, while it connects, it will be a capacitor C12 and C13. Since charge time becomes long and Diack's Da trigger time becomes late, a phase angle becomes large, the electric energy supplied to a light declines, and the brightness of a light falls.

[0035] On the contrary, resistance R14 and R15 If another side where inner resistance is low is connected, it will be a capacitor C12 and C13. Since charge time becomes short and Diack's Da trigger time becomes early, a phase angle becomes small, the electric energy supplied to a light increases, and the brightness of a light increases.

[0036] Thus, it is the exterior of a case object to the terminal area 33a by a pin. The arbitrary terminal areas 33b and 33c By connecting alternatively, volume is not used but a modulated light value can be adjusted easily.

[0037] Moreover, by not using volume, it can do small and dimmer control can be stored in 1 module type.

[0038] Moreover, for example compared with a copper foil with a thin printed circuit board, the

terminal 31 with large current capacity, 32 and the electric conduction board 46, and 47 can be used for the portion into which the main circuit current of a modulated light circuit flows.

Furthermore, it is a capacitor C11 to these terminals 31, 32 and the electric conduction board 46, 47, etc. A connecting point can be lessened compared with the case where could connect electric parts, such as Inductor L, directly, for example, a printed circuit board is used.

[0039] In addition, as a connection means, you may use not only a pin but other composition.

[0040]

[Effect of the Invention] According to the electric device according to claim 1, by connecting alternatively the terminal area of arbitrary setting means of operation to the terminal area of a part of operation by a connection means, volume cannot be used, but operation of a part of operation can be adjusted easily, and a miniaturization can also be attained.

[0041] Since according to the electric device according to claim 2 in addition to the effect of an electric device according to claim 1 the external surface of the case object was made to face and the terminal area was prepared, a connection means is connectable from the exterior of a case object.

[0042] It is easily [the terminal area which corresponds if a pin is inserted in the arbitrary plug holes by which according to the electric device according to claim 3 in addition to the effect of the electric device of claim 2 description a connection means is a pin and was prepared in the external surface of the case object] connectable.

[0043] According to the electric device according to claim 4, since the terminal area is prepared in the circuit board in addition to the effect of an electric device Claim 1 or given [any 1] in three, assembly nature is good while electric connection is easy.

[0044] According to the electric device according to claim 5, in addition to the effect of an electric device Claim 1 or given [any 1] in four, a part of operation is a subsequent movement circuit part, does not use volume but can adjust subsequent movement time.

[0045] According to the electric device according to claim 6, in addition to the effect of an electric device Claim 1 or given [any 1] in four, a part of operation is a modulated light circuit part, does not use volume but can adjust modulated light.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is a **** sectional view from the side about the subsequent movement switch in which the form of operation of the 1st of this invention is shown.

[Drawing 2] It is a **** sectional view from an end face about a subsequent movement switch same as the above.

[Drawing 3] It is the circuit diagram of the damping time constant circuit of a delay circuit part same as the above.

[Drawing 4] It is the circuit diagram of the dimmer control in which the form of operation of the 2nd of this invention is shown.

[Drawing 5] It is the perspective view of a decomposition state of dimmer control same as the above.

[Explanations of letters or numerals]

1 Case Object

6a, 6b, 6c Plug hole

17 Subsequent Movement Circuit Part as a Part of Operation

18 Circuit Board

19a 19b, 19c Terminal area

20 Pin as a Connection Means

R1, R2, R14, R15 Resistance as a setting means of operation

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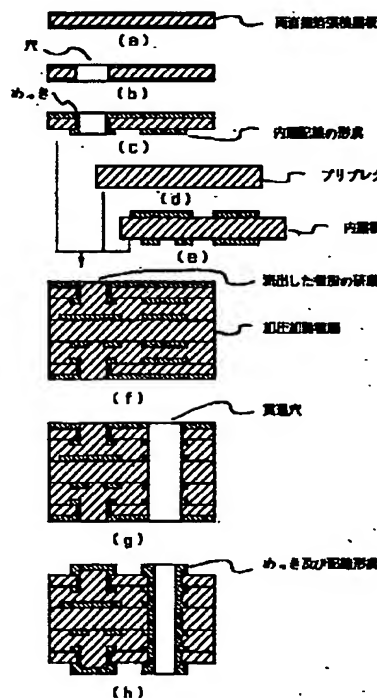
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(54) 【発明の名称】 多層プリント配線板の製造法

(57) 【要約】

【目的】 配線密度に優れかつ簡便なサーフェスビアホール付き多層プリント配線板の製造法を提供すること。

【構成】 第1の金属箔に接着剤層を設け、この接着剤層をBステージにする工程と、Bステージの接着剤層を設けた第1の金属箔に穴をあける工程と、前記第1の金属箔の接着剤層側の面に第2の金属箔を貼り合わせ、加熱加圧して積層一体化する工程と、第2の金属箔の不要箇所をエッチング除去して配線を形成する工程と、前記配線を形成したものと、内層配線を有する内層基板とを、接着性の樹脂層を介して重ね、加熱加圧して積層一体化する工程と、積層一体化したものを貫通する穴をあける工程と、穴をあけた積層板の表面に配線を形成し、穴内壁に金属層を設け電氣的な接続を形成する工程とを有すること。



【特許請求の範囲】

【請求項1】以下の工程を有することを特徴とする多層プリント配線板の製造法。

(a) 第1の金属箔に接着剤層を設け、この接着剤層をBステージにする工程

(b) Bステージの接着剤層を設けた第1の金属箔に穴をあける工程

(c) 前記第1の金属箔の接着剤層側の面に第2の金属箔を貼り合わせ、加熱加圧して積層一体化する工程

(d) 第2の金属箔の不要箇所をエッチング除去して配線形成する工程

(e) 前記配線形成したものと、内層配線を有する内層基板とを、接着性の樹脂層を介して重ね、加熱加圧して積層一体化する工程

(f) 積層一体化したものを貫通する穴をあける工程

(g) 穴をあけた積層板の表面に配線を形成し、穴内壁に金属層を設け電気的な接続を形成する工程

【請求項2】以下の工程を有することを特徴とする多層プリント配線板の製造法。

(a) 片面金属張り積層板の絶縁材料側の面に接着剤層を設け、この接着剤層をBステージにする工程

(b) Bステージの接着剤層を設けた片面金属張り積層板に穴をあける工程

(c) 前記片面金属張り積層板の接着剤層側の面に第2の金属箔を張り合わせ、加熱加圧して積層一体化する工程

(d) 第2の金属箔の不要箇所をエッチング除去して配線形成する工程

(e) 前記配線形成したものと、内層配線を有する内層基板とを、接着性の樹脂層を介して重ね、加熱加圧して積層一体化する工程

(f) 積層一体化したものを貫通する穴をあける工程

(g) 穴をあけた積層板の表面に配線を形成し、穴内壁に金属層を設け電気的な接続を形成する工程

【請求項3】加熱加圧して積層一体化する工程において、Bステージの接着剤層の流動量が、基板の表面方向において $200\mu\text{m}$ 未満である接着剤を用いることを特徴とする請求項1または2記載の多層プリント配線板の製造法。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、多層プリント配線板の製造法に関する。

【0002】

【従来の技術】多層プリント配線板は、配線の高密度化に伴って、一つの配線層と他の配線層の電気的接続に使用される導通穴の数が増加する。従来この導通穴は、配線層を多数重ねて積層した後に、全体を貫通する穴をあけ、その穴内壁をめっきすることによって行われていた。この場合、必要な接続を行う層間以外の層にまで穴

があけられ、接続と無関係な層においては、その貫通穴の箇所を避けて配線を行わなければならない、この方法では、設計の自由度や配線の高密度化の障害になっている。

【0003】そこで、配線板全体を貫通する穴だけを使用するのではなく、隣接する配線層のみの接続を行う、いわゆるインタスティシャルバイアホールを形成する方法が開発されている。この多層プリント配線板の最外層と内層の接続を行うインタスティシャルバイアホール（以下、サーフェイスビアホールと呼ぶ）の製造方法には、現在、基本的に以下の2通りの方法が知られている。

【0004】第一の方法は、図2に示す様に、両面銅箔張り積層板にサーフェイスビアホールのための貫通穴をあけ、この貫通穴にめっきを行った後、片側の面の配線を形成し、別に製造した内層配線基板との間にプリアレグを挟み加熱加圧積層し、多層プリント配線基板を製造し、次に貫通穴をあけ、貫通穴及び基板表面にめっきを行った後、エッチング法によって多層プリント配線板を製造するものである。

【0005】第二の方法は、先に積層しておいて、表面層と、その表面層と接続を行う層の接続を行う方法であって、導通穴を、接続を行う層にまでしかあけないことが特徴になっている。さらに具体的には、複数の配線層とそれを支える絶縁層を交互に積層しておき、表面には銅箔を残しておき、表面の回路と接続する箇所に、接続する深さまで、ドリルで穴をあけ、穴内壁に無電解めっきを行い、必要な場合には続いて電解めっきを行い、表面の配線の不要な部分をエッチングで除去して製造する方法である。

【0006】

【発明が解決しようとする課題】これらの従来の方法のうち、第一の方法では、サーフェイスビアホールのめっきと貫通穴のめっきが別工程になるため工程が複雑となる。また、表面層の金属層の厚さは、両面銅箔張り積層板の銅箔にサーフェイスビアホールめっき時のめっき及び貫通穴めっき時のめっきが加わるために著しく厚くなるので、配線形成におけるエッチング膜圧が厚いために配線形成不良が発生し易くなるとともに、微細な配線の形成が困難である。さらにまた、加熱加圧積層時にサーフェイスビアホールからプリアレグ樹脂が外側の銅箔表面に流れ出すのでこれを研磨等で除去しなければならないという課題がある。

【0007】第二の方法では、サーフェイスビアホールのめっきと貫通穴のめっきが別工程になることもなく、また、表面層の金属層の厚さが厚くなり配線形成が困難になることもない。しかし、サーフェイスビアホールのための穴を積層後にドリルによってあける方法では所望の内層銅の部分で丁度ドリルを止めるということは極めて困難である上、基板の厚さにはばらつきがあるので、

内層銅の面に届かないことや内層銅の位置よりも深い穴になるという課題がある。

【0008】本発明は、配線密度に優れかつ簡便なサーフェイスビアホール付き多層プリント配線板の製造法を提供することを目的とする。

【0009】

【課題を解決するための手段】本発明の多層プリント配線板の製造法は、以下の工程を有することを特徴とする。

(a) 第1の金属箔に接着剤層を設け、この接着剤層を Bステージにする工程

(b) Bステージの接着剤層を設けた第1の金属箔に穴をあける工程

(c) 前記第1の金属箔の接着剤層側の面に第2の金属箔を貼り合わせ、加熱加圧して積層一体化する工程

(d) 第2の金属箔の不要箇所をエッチング除去して配線を形成する工程

(e) 前記配線を形成したものと、内層配線を有する内層基板とを、接着性の樹脂層を介して重ね、加熱加圧して積層一体化する工程

(f) 積層一体化したものを貫通する穴をあける工程

(g) 穴をあけた積層板の表面に配線を形成し、穴内壁に金属層を設け電気的な接続を形成する工程

【0010】また、金属箔に代えて、片面金属張り積層板を用いることもでき、この場合の製造法は以下の工程となる。

(a) 片面金属張り積層板の絶縁材料側の面に接着剤層を設け、この接着剤層をBステージにする工程

(b) Bステージの接着剤層を設けた片面金属張り積層板に穴をあける工程

(c) 前記片面金属張り積層板の接着剤層側の面に第2の金属箔を張り合わせ、加熱加圧して積層一体化する工程

(d) 第2の金属箔の不要箇所をエッチング除去して配線を形成する工程

(e) 前記配線を形成したものと、内層配線を有する内層基板とを、接着性の樹脂層を介して重ね、加熱加圧して積層一体化する工程

(f) 積層一体化したものを貫通する穴をあける工程

(g) 穴をあけた積層板の表面に配線を形成し、穴内壁に金属層を設け電気的な接続を形成する工程

【0011】本発明に用いる金属箔は、プリント配線板用に用いられる金属箔であり、厚さは単一の金属層の場合、 $9\mu\text{m}$ 以上である。樹脂又は金属層のキャリア付きの極薄金属の場合は $1\mu\text{m}$ 以上のものが使用できる。このような金属箔の金属の種類としてもっとも一般的なものは銅である。銅以外にも各種の銅合金あるいはニッケル等が使用できる。

【0012】本発明では、このような金属箔に代えて片面金属張り積層板が使用できる。本発明で用いる片面金

属張り積層板は、その片面に金属箔を貼り合わせた絶縁材料、例えばガラス布-エポキシ樹脂を用いた片面銅箔張り積層板や、フレキシブルなポリイミドフィルムを用いた片面銅箔張りフレキシブルシー等が使用できる。この絶縁材料には紙、不織布あるいはガラス布等の供花繊維に樹脂を含浸した有機材料やフレキシブルなフィルム、あるいはこのような材料とセラミックス等の複合化された材料が使用できる。樹脂としては、フェノール樹脂、エポキシ樹脂、ポリイミド樹脂、ポリエステル樹脂、フッ素樹脂等が使用できる。更にまた、これらの絶縁材料中に無電解めっき用触媒を分散させたものも使用できる。

【0013】本発明に用いる接着剤層としては、エポキシ樹脂系接着剤、アクリル変成樹脂系、あるいはポリイミド樹脂系接着剤等が使用でき、これらを、ロールコーティング、ディップコーティング、カーテンコーティング、スクリーン印刷法等によって塗布することができる。また、更にこれらの接着剤をフィルム化したものも使用でき、G604（日立化成工業株式会社製、商品名）等のエポキシ接着フィルム、バイラックス（デュボン社製、商品名）等のアクリル変成樹脂フィルムあるいはAS-2210（日立化成工業株式会社製、商品名）等のポリイミド接着フィルム等が使用できる。これらの接着フィルムを、銅箔や片面銅箔張り積層板に貼り合わせるのであるが、貼り合わせ後は、Bステージの状態になっている必要がある。

【0014】本発明で言うBステージとは、金属箔や片面金属張り積層板に接着剤層を設けた状態で、 40°C 以下では粘着性を持たず、その後の多層化によって、接着強度が $0.8\text{kgf}/\text{cm}$ 以上を与えることができる半硬化状態をいう。このようなBステージ状態にする方法は、通常の樹脂のように、完全には硬化しない温度と時間、加熱して行う。この程度は、実験的に求めるのが通常である。

【0015】Bステージの接着剤層を設けた基板の穴あけには、ドリルやパンチング等が使用できる。また、加熱加圧して積層一体化する工程において、このBステージの接着剤層の流動量は、基板の表面方向に対して、 $200\mu\text{m}$ 未満であることが好ましい。この流動量が大いだと、加熱加圧した時に、サーフェイスビアホールの接続のために露出している配線導体の面積が小さくなり、接続信頼性が低下する。

【0016】

【作用】本発明の方法によって、銅箔又は片面銅箔張り積層板の絶縁層側にBステージの接着剤層を形成し、ドリル又はパンチングで穴をあけた後、この接着剤層側に銅箔を貼り付けることによって非貫通のサーフェイスビアホールを形成するので貫通穴とサーフェイスビアホールに同時にめっきを行うことが可能となる。

【0017】

【実施例】実施例1

以下、図面に基づいて本発明の一実施例を詳細に説明する。図1(a)に示す様に、厚さ $18\mu\text{m}$ の銅箔の粗化処理面に、厚さ $55\mu\text{m}$ のエポキシ接着フィルムであるG604(日立化成工業株式会社製、商品名)を貼り、圧力 $10\text{kgf}/\text{cm}^2$ 、 150°C で7分間加熱して、Bステージにする。続いて図1(b)に示す様に、サーフェイスビアホールのための穴をドリル加工によってあける。この最小穴径は 0.25mm であった。次に図1(c)に示す様に、接着フィルムの面に厚さ $18\mu\text{m}$ の銅箔の粗化処理面が接する様に重ね合わせ、加熱加圧して積層一体化した。この時の積層条件は、圧力 $44\text{kgf}/\text{cm}^2$ 、 170°C で50分間であった。続いて、図1(d)に示すように内層配線を形成した。続いて、別に作製した内層配線板[図1の(f)]と図1(d)の内層配線面との間にプリプレグを挟み、加熱加圧積層することによって図1(g)に示す多層基板を得た。この時の積層条件は、圧力 $40\text{kgf}/\text{cm}^2$ 、 170°C 60分間であった。次にこの多層基板に直径 0.4mm の貫通穴をドリル加工によってあけた。次に無電解銅めっき

と電解めっきで厚さ $35\mu\text{m}$ のめっきを行った。次に一般的な配線形成方法であるテンティング法によって配線を形成し、図1(h)の多層プリント配線板を得た。

【0018】実施例2

実施例1において使用した銅箔の代わりに、ガラスエポキシ片面銅箔張り積層板(日立化成工業株式会社製、商品名E-67、厚さ 0.1mm)を用いた他はすべて実施例1と同様にして多層プリント配線板を製造した。

【0019】以上のようにして作成した多層プリント配線板は、いずれも、配線密度は高く、工程も簡便であった。

【0020】

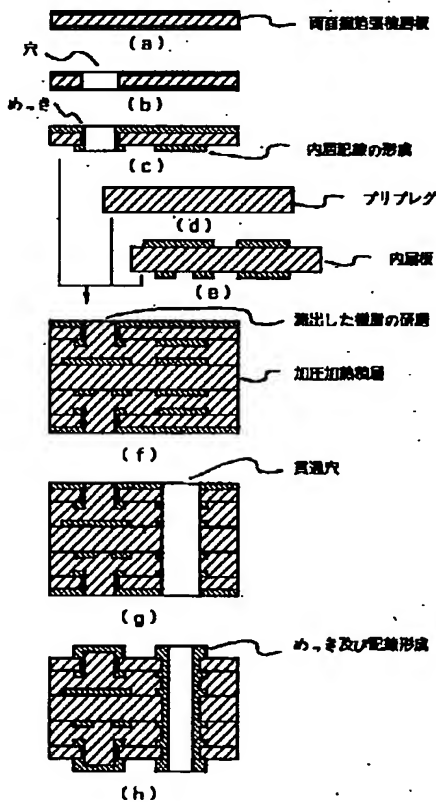
【発明の効果】以上に説明したように、本発明によって、配線密度に優れ、かつ簡便なサーフェイスビアホール付き多層プリント配線板を提供することができる。

【図面の簡単な説明】

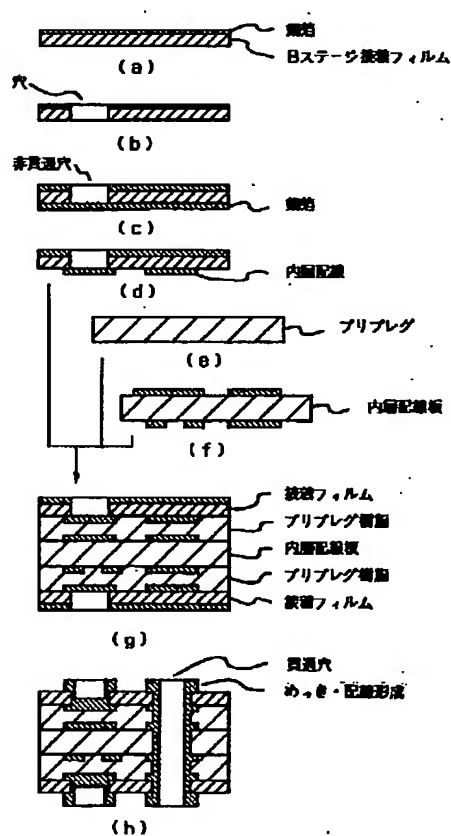
【図1】(a)～(h)は本発明の一実施例を説明するための各工程における断面図である。

【図2】(a)～(h)は従来例を示す各工程における断面図である。

【図1】



【図2】



フロントページの続き

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